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Oxidative stress and anti-obesity approach in behavior of COVID-19: A review

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Chronic low grade inflammation and oxidative stress is major pathological process that takes part in obesity and it restrict ventilation, impairs immune responses. Oxidative stress may be liable for the alveolar harm, thrombosis and RBC dysregulation and leptin might be the connection high pervasiveness as a comorbidity of the SARS-CoV-2 contamination. In current situation, obesity with hyper leptin, is a perceived hazard factor for clinical results of SARS-CoV-2. Conventional spices from assorted topographical areas and different territories are considered as likely wellsprings of new medications for treatment of viral contaminations. Spices like *Curcuma longa*, *Shilajeet*, *Commiphora mukul* and *Plumbago zeylanica* independently and alongside its mix is useful in decrease of oxidative stress as well as leptin concentration. Thus, we can assume that might be useful in avoidance of corpulence and seriousness of SARS-CoV-2 contamination

Keywords: Leptin, Obesity, Oxidative stress, SARS-CoV-2

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Corona virus disease (COVID-19) which is almost unknown to world before December 2019 declared a Public Health Emergency of International Concern (PHEIC) within three months of its emergence[1]. The variable seriousness of COVID-19 disease is probably going to be multifactorial and age, sex, extreme corpulence and diabetes are settled hazard factors for expanded horribleness and mortality[2]. Obesity can limit ventilation by hindering stomach trip, weakens invulnerable reactions to viral contamination[3]. Weight expanded the hazard for creating extreme pneumonia in patients with COVID-19 contamination[4] and BMI more prominent than 40 kg/m^2 have most grounded chance factor for hospitalization[5]. Besides, BMI more prominent than 35 kg/m^2 and more youthful than 60 years bound to be admitted to intense and basic consideration contrasted and patients in a similar age class and with BMI under 30 kg/m$^{2(\text{ref. 6})}$.

Natural products and their derivatives are used in folk medicine to treat plentiful ailments such as obesity, viral infections etc.[7,8]. The scope of herbal medicines in the context of nutraceuticals market is vast[8] and the acceptability and, therefore, research on plant-based drugs are growing[9] on a daily basis. Nature provides a vast library of chemicals to explore and develop drugs for treatment of various ailments including viral diseases[9]. To date, a good number of herbal medicines or their constituents have shown potential antiviral and anti-obesity activity[10,8]. The curcumin and plumbagin is major component of *Curcuma longa* and *Plumbago zeylanica* has been able to inhibit viral replication[11] and anti-oxidant properties has been used in obesity in *Ayurveda* and contemporary science[12-14]. Whereas, *Shilajit* and *Guggul* have potent anti-obesity activity[15,16]. Apart from that in the classics of *Ayurveda* like *Charak Samhita* and *Sushrut Samhita*, *Shilajit* and *Guggul* has been indicated in *sthaulya*/obesity, respectively.

Obese persons are suspected to severe clinical features and bad prognosis when infected with corona virus[17] and need special attention in this pandemic period[18]. Conventional spices from different topographical areas and different natural surroundings are considered as expected wellsprings of new medications for treatment of viral contaminations, including those brought about by SARS-CoV[19].

COVID medication

Clinical trials have been conducted for various medicines like remdesivir, chloroquine, vitamin C, Vitamin D, glucocorticoids etc. but could not get licensed from WHO or any other agencies like U.S. Food and Drug Administration (FDA), European Medicines Agency (EMA), Spanish Agency of

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Medicines and Medical Devises (AEMPS) etc. and to the authors' knowledge, currently no antiviral drugs have been licensed against Covid-19. Further, hand hygiene, respiratory hygiene, social distancing are three preventing measures for the COVID-19 whereas quarantine will check the transmission of corona virus to community.

Obesity and COVID-19

Separation and restriction of movements (quarantine) for the purpose of preventing transmission of diseases, is associated to the interruption of the work routine and stay in boredom that may be associated with a greater energy intake[20]. Additionally, this pandemic might be stressful. Stress pushes people towards comfort foods[21] and food craving, multidimensional idea including passionate (serious want to eat), social (looking for food), psychological (contemplations about food) and physiological (salivation) forms[22].

COVID-19 patients with extreme stoutness were multiple times bound to require obtrusive mechanical ventilation with a typical BMI[23]. Furthermore, metabolic syndrome seems may be related with a worse prognosis in patients of COVID-19. Although natural link between obesity, metabolic syndrome and covid-19 along with prevalence is unknown but it has been mentioned that obesity facilitates the infection of influenza virus[24] and reflected as negative prognostic factor for COVID-19[25,26]. As there does not exists a definitive treatment for the viral infection in conventional medicine, the symptomatic management and empirical line of management is considered as the standard line of care. Preventive medicine being the core objective of Ayurveda by maintaining health of a healthy individual

Discussion

Antioxidant deprivation is crucial for viral replication and the subsequent virus-associated disease[27]. Anti-oxidative therapy may be proposed to improve cardiogenic fatalities caused by COVID-19. It has been mentioned that plant extract having IC_{50} 34 to 88 μg/mL able to inhibit covid virus[28,19], so that *Guggul* and *Chitrak* having IC_{50} 20.56 and 67.71 μg/mL, respectively may also able to inhibit covid virus[29]. Inexpensive medicinal antioxidants incorporate Vitamin C (ascorbic corrosive) and Vitamin E, in light of the fact that their reductive hydrogen particles can respond with ROS and afterward produce nontoxic water[30]. Plant-derived molecules such as Curcumin and Baicalin may have possible subterranean insect oxidative adequacy[31]. Further, zinc hindered serious intense respiratory disorder (SARS) coronavirus RNA-dependent RNA polymerase (RdRp) template binding and elongation in Vero-E6 cells[32].

Obesity is linked with impaired pulmonary function, resultant in reduced oxygen concentration[33]. Furthermore, chronic low-grade inflammation and pro-inflammatory cytokines such as interleukin 6, tumor necrosis, leptin are associated with obesity that may impair immune response, thus contributing to the increased morbidity associated with obesity in COVID-19 infection. Obese individuals having constantly higher leptin and lower adiponectin concentration which is troublesome hormonal status that leads to dysregulation of immune response[34]. So that, following interventions aimed at improving immune response, lose weight with caloric restriction; repetition mild-to-moderate physical exercise[35] may be effective in covid infection.

Oxidative stress is associated with maturing[36] and partakes in chronic pathologies, for example, diabetes mellitus, malignant growths, hypertension, coronary illness, and so forth[37] and certain contaminations, especially by the RNA viruses[38], belonging to corona virus family[39]. Furthermore, it is set off by a wide assortment of viral contaminations[38,40] including HIV 1, viral hepatitis B,C,D infections, herpes viruses, respiratory viruses, most of the RNA viruses[39] probably also corona viruses belonging to this family. Oxidative stress may be accountable for the alveolar impairment, coagulation and RBC dysregulation in COVID-19[41,42]. Furthermore, elevated leptin concentrations damage pulmonary protection[43] and induce oxidative stress[44] which influences them for inferior outcomes and casualty in covid[45]. Thus, leptin may be the link higher pervasiveness as comorbidity to SARS-CoV-2 infection[46]. It seems that oxidative stress plays significantly role in pathogenesis and severity of corona virus by providing antioxidant may be fruitful in covid management. The combination of *C. longa*, *Guggul*, *Shilajeet*, and *Chitrak* reduces the oxidative stress, thus it may be beneficial in covid management. (Fig. 1).

C. longa plays asignificant role to maintain harmony and nutritional requirement by influencing oxidative stress, adinopectin concentration[13], *Shilajeet* contains, fulvic acid as major component along with 84 different elements like selenium, iron, copper, zinc[31] and delivers the crucial elements[47]. It amplifies

bio-availability of other herbs[16], decreases stress and stimulates the immune system and reduces chronic fatigue[14]. *Guggul* and *Plumbago zeylanica* exhibited potent anti-oxidant activity and anti-obesity activity[12,48,49]. Additionally, formulation prepared by *Curcuma longa*, *Shilajeet Commiphora mukul* and *Plumbago zeylanica* decreases oxidative stress and leptin concentration[50]. Thus, we can assume that *Curcuma longa*, *Shilajeet*, *Commiphora mukul* and *Plumbago zeylanica* individually and along with its combination may be helpful in prevention as well as severity of covid.

Conclusion

Oxidative stress and leptin is one of the major causes of obesity and symbolizes a hazard for more severity and bad prognosis in patients with COVID-19 infection. Thus, reduction of oxidative stress and leptin is helpful in management of obesity and prevention as well as severity of covid. *Curcuma longa*, *Shilajeet*, *Commiphora mukul* and *Plumbago zeylanica* individually and along with its combination may be helpful in prevention as well as severity of SARS-CoV-2.

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